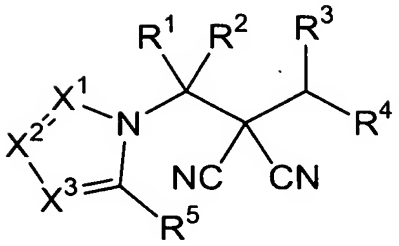
CLAIMS

1. A malononitrile compound represented by the formula (I):



(I)

, wherein, in the formula,

R^1 represents a C1-C5 alkyl group optionally substituted by at least one halogen atom, a C2-C5 alkenyl group optionally substituted by at least one halogen atom, a C2-C5 alkynyl group optionally substituted by at least one halogen atom or a hydrogen atom;

R^2 represents a C1-C5 alkyl group optionally substituted by at least one halogen atom, a C1-C5 alkoxy group optionally substituted by at least one halogen atom, a C2-C5 alkenyl group optionally substituted by at least one halogen atom, a C2-C5 alkynyl group optionally substituted by at least one halogen atom, a cyano group or a hydrogen atom;

each of R^3 and R^4 represents a C1-C5 alkyl group optionally substituted by at least one halogen atom, a C2-C5 alkenyl group optionally substituted by at least one halogen atom, a C2-C5 alkynyl group optionally substituted by at least one halogen atom, a C3-C5 cycloalkyl group optionally substituted by at least one halogen atom or at least one C1-C3 alkyl group, a C4-C5 cycloalkenyl group optionally substituted by at least one halogen atom or a hydrogen atom,

or represents a C2-C6 alkanediyl group optionally substituted

by at least one halogen atom or C4-C6 alkenediyl group optionally substituted by at least one halogen atom in which R^3 and R^4 are coupled one another at the end thereof;

each of X^1, X^2 and X^3 represents a nitrogen atom or a CR^6;

each of R^5 and R^6 represents a halogen atom, a cyano group, a nitro group, a hydroxyl group, a mercapto group, a formyl group, a SF_5 group, a carboxyl group, a C1-C5 alkyl group optionally substituted by at least one halogen atom, a C2-C5alkenyl group optionally substituted by at least one halogen atom, a C2-C5 alkynyl group optionally substituted by at least one halogen atom, a C3-C6 cycloalkyl group optionally substituted by at least one halogen atom or at least one C1-C3 alkyl group, a C1-C5 alkoxy group optionally substituted by at least one halogen atom, a C3-C6 alkenyloxy group optionally substituted by at least one halogen atom, a C3-C6 alkynyloxy group optionally substituted by at least one halogen atom, a C1-C5 alkylthio group optionally substituted by at least one halogen atom, a C3-C5 alkenylthio group optionally substituted by at least one halogen atom, a C3-C5 alkynylthio group optionally substituted by at least one halogen atom, a C1-C5 alkylsulfinyl group optionally substituted by at least one halogen atom, a C1-C5 alkylsulfonyl group optionally substituted by at least one halogen atom, a C2-C6 alkylcarbonyl group optionally substituted by at least one halogen atom, a C2-C5 alkoxycarbonyl group optionally substituted by at least one halogen atom, a group designated by $NR^{10}R^{11}$, a group designated by $C(=X^5)NR^{12}NR^{13}$, a group designated by $(CH_2)_mQ$, a group designated by $C(=NOR^{17})R^{18}$ or a hydrogen atom;

in case of two atoms are adjoined and each of the adjoined two

atoms is bonded with one of R^5 and R^6 or two R^6s; the R^5 and R^6, which are bonded with the adjoined two atoms or the two R^6s, which are bonded with the adjoined two atoms, may be coupled one another at the end thereof and represent a C2-C6 alkanediyl group optionally substituted by at least one halogen atom or C4-C6 alkenediyl group. And in this case, at least one methylene group structuring said alkanediyl group or said alkenediyl group may be replaced by an oxygen atom a sulfur atom or NR^7 group;

R^7 represents a C1-C5 alkyl group optionally substituted by at least one halogen atom, a C3-C5 alkenyl group optionally substituted by at least one halogen atom, a C3-C5 alkynyl group optionally substituted by at least one halogen atom, a C3-C6 cycloalkyl group optionally substituted by at least one halogen atom or at least one C1-C3 alkyl group, a C2-C6 alkylcarbonyl group optionally substituted by at least one halogen atom, a C2-C5 alkoxycarbonyl group optionally substituted by at least one halogen atom or a hydrogen atom;

each of R^{10} and R^{11} represents a C1-C5 alkyl group optionally substituted by at least one halogen atom, a C3-C5 alkenyl group optionally substituted by at least one halogen atom, a C3-C5 alkynyl group optionally substituted by at least one halogen atom, a C3-C6 cycloalkyl group optionally substituted by at least one halogen atom or at least one C1-C3 alkyl group, a (C1-C5 alkoxy group optionally substituted by at least one halogen atom) C1-C3 alkyl group, a C1-C5 alkylslufinyl group optionally substituted by at least one halogen atom, a C1-C5 alkylsulfonyl group optionally substituted by at least one halogen atom, a C2-C6 alkylcarbonyl group optionally substituted by at least

one halogen atom, a C2-C5 alkoxycarbonyl group optionally substituted by at least one halogen atom or a hydrogen atom;

each of R^{12} and R^{13} represents a C1-C5 alkyl group optionally substituted by at least one halogen atom, a C3-C5 alkenyl group optionally substituted by at least one halogen atom, a C3-C5 alkynyl group optionally substituted by at least one halogen atom, a C3-C6 cycloalkyl group optionally substituted by at least one halogen atom or at least one C1-C3 alkyl group, a group designated by $(CH_2)_mQ$ or a hydrogen atom;

or represents a C2-C6 alkanediyl group optionally substituted by at least one halogen atom or C4-C6 alkenediyl group optionally substituted by at least one halogen atom in which R^{12} and R^{13} are coupled one another at the end thereof;

each of R^{17} and R^{18} represents a C1-C5 alkyl group optionally substituted by at least one halogen atom, a C3-C5 alkenyl group optionally substituted by at least one halogen atom, a C3-C5 alkynyl group optionally substituted by at least one halogen atom, a C3-C6 cycloalkyl group optionally substituted by at least one halogen atom or at least one C1- C3 alkyl group, a group designated by $(CH_2)_mQ$ or a hydrogen atom;

Q represents an aryl group optionally substituted by at least one R^{14};

each of R^{14}s represents

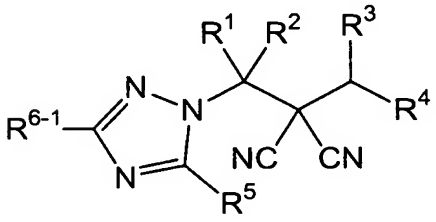
a C1-C5 alkyl group optionally substituted by at least one halogen atom, a C3-C6 cycloalkyl group optionally substituted by at least one halogen atom or at least one C1-C3 alkyl group, a C1-C5 alkoxy group optionally substituted by at least one halogen atom, C1-C5 alkylthio group optionally substituted by at least one halogen

atom, a C3-C5 alkenylthio group optionally substituted by at least one halogen atom, a C3-C5 alkynylthio group optionally substituted by at least one halogen atom, a C1-C5 alkylsulfinyl group optionally substituted by at least one halogen atom, a C1-C5 alkylsulfonyl group optionally substituted by at least halogen atom, C2-C6 alkylcarbonyl group optionally substituted by at least one halogen atom, C2-C5 alkoxycarbonyl group optionally substituted by at least one halogen atom or a halogen atom;

m represents an integer of from 0 to 5;

X^5 represents an oxygen atom or a sulfur atom.

2. The malononitrile compound according to claim 1, which is represented by the formula (I-1):



(I-1)

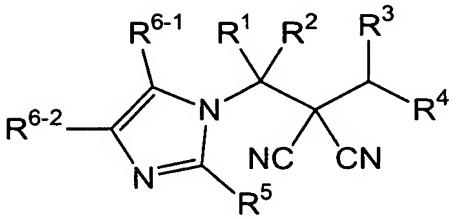
, wherein, in the formula,

R^1, R^2, R^3 and R^4 have the same meaning as defined in claim 1;

each of R^5 and R^{6-1} represents a halogen atom, a cyano group, a nitro group, a hydroxyl group, a mercapto group, a formyl group, a SF_5 group, a carboxyl group, a C1-C5 alkyl group optionally substituted by at least one halogen atom, a C2-C5alkenyl group optionally substituted by at least one halogen atom, a C2-C5 alkynyl group optionally substituted by at least one halogen atom, a C3-C6 cycloalkyl group optionally substituted by at least one halogen atom or at least one C1-C3 alkyl group, a C1-C5 alkoxy

group optionally substituted by at least one halogen atom, a C3-C6 alkenyloxy group optionally substituted by at least one halogen atom, a C3-C6 alkynyloxy group optionally substituted by at least one halogen atom, a C1-C5 alkylthio group optionally substituted by at least one halogen atom, a C3-C5 alkenylthio group optionally substituted by at least one halogen atom, a C3-C5 alkynylthio group optionally substituted by at least one halogen atom, a C1-C5 alkylsulfinyl group optionally substituted by at least one halogen atom, a C1-C5 alkylsulfonyl group optionally substituted by at least one halogen atom, a C2-C6 alkylcarbonyl group optionally substituted by at least one halogen atom, a C2-C5 alkoxycarbonyl group optionally substituted by at least one halogen atom, a phenyl group or a hydrogen atom.

3. The malononitrile compound according to claim 1, which is represented by the formula (I-2):



(I-2)

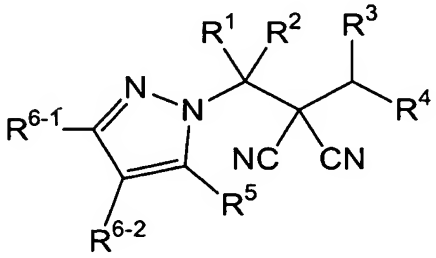
, wherein, in the formula,

R^1, R^2, R^3 and R^4 have the same meaning as defined in claim 1;

each of R^5, R^{6-1} and R^{6-2} represents a halogen atom, a cyano group, a nitro group, a hydroxyl group, a mercapto group, a formyl group, a SF_5 group, a carboxyl group, a C1-C5 alkyl group optionally substituted by at least one halogen atom, a C2-C5alkenyl group optionally substituted by at least one halogen atom, a C2-C5 alkynyl group optionally substituted by at least one halogen

atom, a C3-C6 cycloalkyl group optionally substituted by at least one halogen atom or at least one C1-C3 alkyl group, a C1-C5 alkoxy group optionally substituted by at least one halogen atom, a C3-C6 alkenyloxy group optionally substituted by at least one halogen atom, a C3-C6 alkynyloxy group optionally substituted by at least one halogen atom, a C1-C5 alkylthio group optionally substituted by at least one halogen atom, a C3-C5 alkenylthio group optionally substituted by at least one halogen atom, a C3-C5 alkynylthio group optionally substituted by at least one halogen atom, a C1-C5 alkylsulfinyl group optionally substituted by at least one halogen atom, a C1-C5 alkylsulfonyl group optionally substituted by at least one halogen atom, a C2-C6 alkylcarbonyl group optionally substituted by at least one halogen atom, a C2-C5 alkoxycarbonyl group optionally substituted by at least one halogen atom, a phenyl group or a hydrogen atom.

4. The malononitrile compound according to claim 1, which is represented by the formula (I-3):



(I-3)

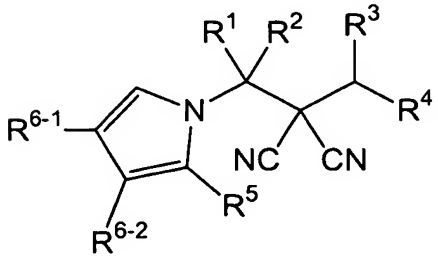
, wherein, in the formula,

R^1, R^2, R^3 and R^4 have the same meaning as defined in claim 1;

each of R^5, R^{6-1} and R^{6-2} represents a halogen atom, a cyano group, a nitro group, a hydroxyl group, a mercapto group, a formyl group, a SF_5 group, a carboxyl group, a C1-C5 alkyl group optionally

substituted by at least one halogen atom, a C2-C5alkenyl group optionally substituted by at least one halogen atom, a C2-C5 alkynyl group optionally substituted by at least one halogen atom, a C3-C6 cycloalkyl group optionally substituted by at least one halogen atom or at least one C1-C3 alkyl group, a C1-C5 alkoxy group optionally substituted by at least one halogen atom, a C3-C6 alkenyloxy group optionally substituted by at least one halogen atom, a C3-C6 alkynyloxy group optionally substituted by at least one halogen atom, a C1-C5 alkylthio group optionally substituted by at least one halogen atom, a C3-C5 alkenylthio group optionally substituted by at least one halogen atom, a C3-C5 alkynylthio group optionally substituted by at least one halogen atom, a C1-C5 alkylsulfinyl group optionally substituted by at least one halogen atom, a C1-C5 alkylsulfonyl group optionally substituted by at least one halogen atom, a C2-C6 alkylcarbonyl group optionally substituted by at least one halogen atom, a C2-C5 alkoxycarbonyl group optionally substituted by at least one halogen atom, a phenyl group or a hydrogen atom.

5. The malononitrile compound according to claim 1, which is represented by the formula (I-4):



(I-4)

, wherein, in the formula,

R^1, R^2, R^3 and R^4 have the same meaning as defined in claim 1;

each of R^5, R^{6-1} and R^{6-2} represents a halogen atom, a cyano group, a nitro group, a hydroxyl group, a mercapto group, a formyl group, a SF_5 group, a carboxyl group, a C1-C5 alkyl group optionally substituted by at least one halogen atom, a C2-C5alkenyl group optionally substituted by at least one halogen atom, a C2-C5 alkynyl group optionally substituted by at least one halogen atom, a C3-C6 cycloalkyl group optionally substituted by at least one halogen atom or at least one C1-C3 alkyl group, a C1-C5 alkoxy group optionally substituted by at least one halogen atom, a C3-C6 alkenyloxy group optionally substituted by at least one halogen atom, a C3-C6 alkynyloxy group optionally substituted by at least one halogen atom, a C1-C5 alkylthio group optionally substituted by at least one halogen atom, a C3-C5 alkenylthio group optionally substituted by at least one halogen atom, a C3-C5 alkynylthio group optionally substituted by at least one halogen atom, a C1-C5 alkylsulfinyl group optionally substituted by at least one halogen atom, a C1-C5 alkylsulfonyl group optionally substituted by at least one halogen atom, a C2-C6 alkylcarbonyl group optionally substituted by at least one halogen atom, a C2-C5 alkoxycarbonyl group optionally substituted by at least one halogen atom, a phenyl group or a hydrogen atom.

6. The malononitrile compound according to any one of claim 2 to claim 5, wherein

R^5 is a hydrogen atom;

each of R^5, R^{6-1} and R^{6-2} is a halogen atom, a C1-C5 alkyl group optionally substituted by at least one halogen atom, a C1-C5 alkoxy group optionally substituted by at least one halogen atom,

a C1-C5 alkylthio group optionally substituted by at least one halogen atom or a hydrogen atom.

7. The malononitrile compound according to any one of claim 2 to claim 5, wherein

R^1, R^2, R^3 and R^5 are hydrogen atoms;

R^4 is a C1-C5 alkyl group optionally substituted by at least one halogen atom or a C2-C5 alkenyl group optionally substituted by at least one halogen atom;

each of R^{6-1} and R^{6-2} is a halogen atom, a C1-C5 alkyl group optionally substituted by at least one halogen atom, a C1-C5 alkoxy group optionally substituted by at least one halogen atom, a C1-C5 alkylthio group optionally substituted by at least one halogen atom or a hydrogen atom.

8. The malononitrile compound according to any one of claim 2 to claim 5, wherein

R^1, R^2, R^3 and R^5 are hydrogen atoms;

R^4 is a 2,2,2-trifluoroethyl group or a vinyl group;

each of R^{6-1} and R^{6-2} is a halogen atom, a C1-C5 alkyl group optionally substituted by at least one halogen atom, a C1-C5 alkoxy group optionally substituted by at least one halogen atom, a C1-C5 alkylthio group optionally substituted by at least one halogen atom or a hydrogen atom.

9. A pesticide composition comprising an effective amount of the malononitrile compound according to claim 1 and a carrier.

10. A method for controlling pests comprising applying an effective amount of the malononitrile compound according to claim 1 to pests or at a habitat of pests.

11. Use of the malononitrile compound according to claim 1 for pest control agent.